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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,281	07/10/2003	James E. C. Brown	TI-36887	2447

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EXAMINER	
VLAHOS, SOPHIA	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
10/05/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/617,281	BROWN, JAMES E. C.	
	Examiner	Art Unit	
	SOPHIA VLAHOS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5,6,9-12,14,15 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,6,9-12,14,15 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments (7/18/2007) with respect to the rejection(s) of independent claim(s) 1 and 10 under 35 U.S.C 103(a) being unpatentable over Mohindra (U.S. 7,035,341) in view of Mohindra (U.S. 6,744, 829).have been fully considered but are moot in view of the new ground(s) of rejection. (Teachings of newly discovered reference to Vassiliou et. al., (U.S. 2004/0106380)).

Claim Objections

2. Claim 1 is objected to because of the following informality:

Claim 1, line 2 after the preamble reads: "in-phase (I) and quadrature phase (Q) tone components: " where the semicolon should be replaced by " ; ".

Claim 15, recites: "wherein frequency scaling...." referring to claim 10, but "frequency scaling" is mentioned in claim 14 not 10. Since method claim 10 corresponds to apparatus claim 1, for rejection purposes it is assumed that claim 15 depends on claim 14 (similarly to apparatus claim 6 depending on claim 5).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2, 5, 9-11, 14, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Vassiliou et. al., (U.S. 2004/0106380) and further in view of Mohindra (U.S. 6,744, 829).

With respect to claim 1, Mohindra (341) discloses: a calibration tone generator (Fig. 4, element 40, "DSP", column 5, lines 40-42, 58-59) for generating a calibration tone for providing in-phase (I) and quadrature phase (Q) tone components (Fig. 4, outputs of mixers 64, 65 of receiving side that receive the calibration tone, column 6, lines 1-3); I and Q lowpass filters for filtering said I and Q calibration tones for issuing filtered I and Q output tones having an undesired frequency dependent I/Q phase error (see Fig. 4, elements 66 and 67, low-pass filters (see column 7, lines 10-12), column 9, lines 4-18, see also column 5, lines 40-52 , $\Delta\Phi_{BB}$ the frequency dependent baseband band IQ phase error);

Mohindra (341) does not expressly teach:

at least one of the I and Q lowpass filters having an adjustable characteristic; said I and Q lowpass filters include an I analog lowpass filter and a Q analog filter and said adjustable characteristic is a cutoff frequency of at least one of said I and Q analog lowpass filters.

a correlator for cross correlating said I and Q output tones for providing a cross correlation feedback signal, said cross correlation feedback signal used for adjusting said adjustable characteristic for reducing said frequency dependent I/Q phase error;

In the same field of endeavor, Vassiliou et. al., disclose: I and Q analog low-pass filters (see Fig. 2, lowpass filters 128, 130, at the receiver side, see lines 6-7, and

4. Claims 1-2, 5, 9-11, 14, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Vassiliou et. al., (U.S. 2004/0106380) and further in view of Mohindra (U.S. 6,744, 829).

With respect to claim 1, Mohindra (341) discloses: a calibration tone generator (Fig. 4, element 40, "DSP", column 5, lines 40-42, 58-59) for generating a calibration tone for providing in-phase (I) and quadrature phase (Q) tone components (Fig. 4, outputs of mixers 64, 65 of receiving side that receive the calibration tone, column 6, lines 1-3); I and Q lowpass filters for filtering said I and Q calibration tones for issuing filtered I and Q output tones having an undesired frequency dependent I/Q phase error (see Fig. 4, elements 66 and 67, low-pass filters (see column 7, lines 10-12), column 9, lines 4-18, see also column 5, lines 40-52 , $\Delta\Phi_{BB}$ the frequency dependent baseband band IQ phase error);

Mohindra (341) does not expressly teach:

at least one of the I and Q lowpass filters having an adjustable characteristic; said I and Q lowpass filters include an I analog lowpass filter and a Q analog filter and said adjustable characteristic is a cutoff frequency of at least one of said I and Q analog lowpass filters.

a correlator for cross correlating said I and Q output tones for providing a cross correlation feedback signal, said cross correlation feedback signal used for adjusting said adjustable characteristic for reducing said frequency dependent I/Q phase error;

In the same field of endeavor, Vassiliou et. al., disclose: I and Q analog low-pass filters (see Fig. 2, lowpass filters 128, 130, at the receiver side, see lines 6-7, and

paragraph [0057]) with at least one of the I and Q lowpass filters having an adjustable characteristic said adjustable characteristic is a cutoff frequency of at least one of said I and Q analog lowpass filters (paragraph [0057]).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Mohindra (341) based on the teachings of Vassiliou et. al., so that the I and Q lowpass filters of Mohindra (341) are analog I and Q lowpass filters at least one of which has an adjustable cutoff-frequency as taught by Vassiliou et. al., and the motivation to do so is to have filters with matched responses (see last two lines of paragraph [0057] of Vassiliou).

In the same field of endeavor, Mohindra (829) discloses: a correlator for cross correlating said I and Q output tones (see Fig. 3, cross-correlation by mixer of $V_I(t)$ and $V_Q(t)$, column 3 lines 17-20, specifically lines 42-51 and equation on line 45 right hand side). At the time of the invention, it would have been obvious to a person of ordinary skill in that [Eqn. 4] of Mohindra (341) see that right side of the equation is $K_3\sin(\Delta\Phi_{BB})$ is equal to the right hand side of the equation on line 45 of column 3 of Mohindra (829) and therefore it would have obvious to a person of ordinary skill in the art that the $I_{sin}(t)Q_{cos}(t)-I_{cos}(t)Q_{sin}(t)$ (equation 4 of column 8 of 7,035,341) performed by DSP 40 of Mohindra (341) can be replaced by the computation of $a\sin(\theta)[n_I(t)*n_I(t)]$ of the equation on line 45 of column 3 of 6,744,829 (column 3, see lines 14-50) since computing the latter equation is independent of a gain and simple to implement (column 3, lines 42-44 and see Fig. 3).

With respect to the limitation: using said cross correlation feedback signal for adjusting said adjustable characteristic for reducing said frequency dependent I/Q phase error. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Mohindra et. al., (341) as modified by Vassiliou et. al., and Mohindra (829) so that the cross correlation feedback signal (see Mohindra 341, column 9, lines 1-3) is used for adjusting said adjustable characteristic (the cutoff frequency of at least one of I and Q analog filters) for reducing said frequency dependent I/Q. The rationale behind such a modification is that such a correction (adjustment of the cutoff frequency of at least one of the I and Q analog filters, (see that mismatches between the cutoff frequencies of the I and Q low-pass filters are identified by Mohindra 341 to be the major cause of frequency dependent phase error, see column 9, lines 4-9) substitutes (is equivalent to) the correction taught by Mohindra 341 (adjustement of relative phases of the I and Q signals using the all-pass networks).

With respect to claim 2, all of the limitations of claim 2, are analyzed above in claim 1 and Mohindra (341) discloses: said cross correlation feedback signal adjusts said adjustable characteristic for minimizing a phase difference between said I output tone and said Q output tone (column 9, lines 1-3).

With respect to claim 5, all of the limitations of claim 5 are analyzed above in claim 1, except for: said cutoff frequency is adjusted by frequency scaling at least one

pole and at least one zero of said at least one of said I and Q analog lowpass filters by a certain common factor.

Poles and zeros of filters (including those of lowpass fitlers) are known in the art and determine the gain and phase vs frequency response of the filter, and therefore it would have been obvious to a person of ordinary skill in the art to modify the system of Mohindra et. al., (adjust the cutoff frequency) by frequency scaling at least one pole and at least one zero of the at least one of said I and Q analog lowpass filters, by a (certain) common factor.

With respect to claim 9 Mohindra et al. (341) disclose:, a frequency downconverter including a local oscillator for providing a complex LO signal and I and Q frequency downconverters using said LO signal for downconverting an input signal having a carrier frequency to I and Q signal components (see Fig. 4, combination of elements LO, filter and PLL (approximately in the center of Fig. 4), mixers 64, 65 of receiving side of transceiver, column 6, lines 1-3); and wherein: the calibration tone generator issues a calibration signal as said input signal having a certain frequency offset from said carrier frequency for providing said I and Q calibration tone components in place of said I and Q signal components (see column 5, lines 67 and column 6, lines 1).

With respect to method claims 10-11,14, 18 these claims are rejected under a rationale similar to the one used to reject apparatus claims 1-2, 5, 9 (respectively) above.

5. Claims 3, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Vassiliou et. al., (U.S. 2004/0106380) and further in view of Mohindra (U.S. 6,744, 829) and Armstrong et. al., (U.S. 5,559,828).

With respect to claim 3, all of the limitations of claim 3 are rejected above in claim 1, except for: said calibration tone has a frequency near to a cutoff frequency for said I and Q lowpass filters. In the same field of endeavor, Armstrong et. al., disclose: said calibration tone has a frequency near to a cutoff frequency for said I and Q filters (column 9, lines 15-18). At the time the invention, it would have been obvious to a person of ordinary skill in the art to have the calibration tone have a frequency near to a cutoff frequency for said I and Q lowpass filters and the rationale behind this modification is that filters at the receiver are (theoretically) supposed to be designed to coincide/match with the transmitted signal characteristic.

With respect to claim 12, method claim 12 is rejected under a rationale similar to the one used to reject apparatus claim 3.

6. Claims 6, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra (U.S. 7,035,341) in view of Vassiliou et. al., (U.S. 2004/0106380) and further in view of Mohindra (U.S. 6,744, 829) and Whiteside (U.S. 5,689,863).

With respect to claim 6, all of the limitations of claim 6 are analyzed above in claim 1, except for: wherein said common scale factor is adjusted by adjusting a channel resistance of at least one transistor.

Solving the same problem (i.e. changing the location of a pole/zero pair), Whiteside discloses: wherein said common scale factor (see column 3,lines 3-9 and column 4, lines 30-35, lines 40-47, the RC constant that determines the center frequency of the pole/zero pair, and by varying the resistance of the MOSFETs it is adjusted) is adjusted by adjusting channel resistance of at least one transistor (column 4, lines 40-47).

Therefore, at the time of the invention, it would have been obvious to a person skilled in the art to modify the system of Mohindra based on the teachings Whiteside, so that the said common scale factor is adjusted by adjusting channel resistance of at least one transistor so that a tunable pole/zero pair (tunable with respect to the pole/zero spacing and center position) can be generated so a desired amount of gain or attenuation is provided at any given frequency (see Whiteside column 1, lines 44-49, and "summary of the invention" where the invention is a low-power device).

With respect to claim 15, method claim 15 is rejected under a rationale similar to the one used to reject apparatus claim 6.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SOPHIA VLAHOS whose telephone number is 571 272 5507. The examiner can normally be reached on MTWRF 8:30-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 571 272 3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SV
9/27/2007

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER